Cambridge Assessment International Education

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8639188823

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/31**

Paper 3 (Core) **May/June 2021**

1 hour 45 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a graphic display calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use your calculator value.

INFORMATION

- The total mark for this paper is 96.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **16** pages.

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Formula List

Area, A, of triangle, base b, height h.	$A = \frac{1}{2}bh$
Area, A, of circle, radius r.	$A = \pi r^2$
Circumference, C, of circle, radius r.	$C = 2\pi r$
Curved surface area, A, of cylinder of radius r, height h.	$A = 2\pi rh$
Curved surface area, A, of cone of radius r, sloping edge l.	$A = \pi rl$
Curved surface area, A, of sphere of radius r.	$A = 4\pi r^2$
Volume, V, of prism, cross-sectional area A, length l.	$V = Al$
Volume, V, of pyramid, base area A, height h.	$V = \frac{1}{3}Ah$
Volume, V, of cylinder of radius r, height h.	$V = \pi r^2 h$
Volume, V, of cone of radius r, height h.	$V = \frac{1}{3}\pi r^2 h$
Volume, V, of sphere of radius r.	$V = \frac{4}{3}\pi r^3$

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Answer **all** the questions.

1 **(a)** Work out.

(i) $\sqrt{36}$

..... [1]

(ii) 7^3

..... [1]

(b) **(i)** $4 \times 4 \times 4 \times 4 \times 4 \times 4 = 4^n$

Write down the value of n.

$n =$ ..... [1]

(ii) Write down the value of 4^0.

..... [1]

(c) Work out.

$$\frac{1}{2^2 + \sqrt{17}}$$

Give your answer correct to 3 decimal places.

..... [2]

(d) **(i)** Write 0.000 082 in standard form.

..... [1]

(ii) Work out.

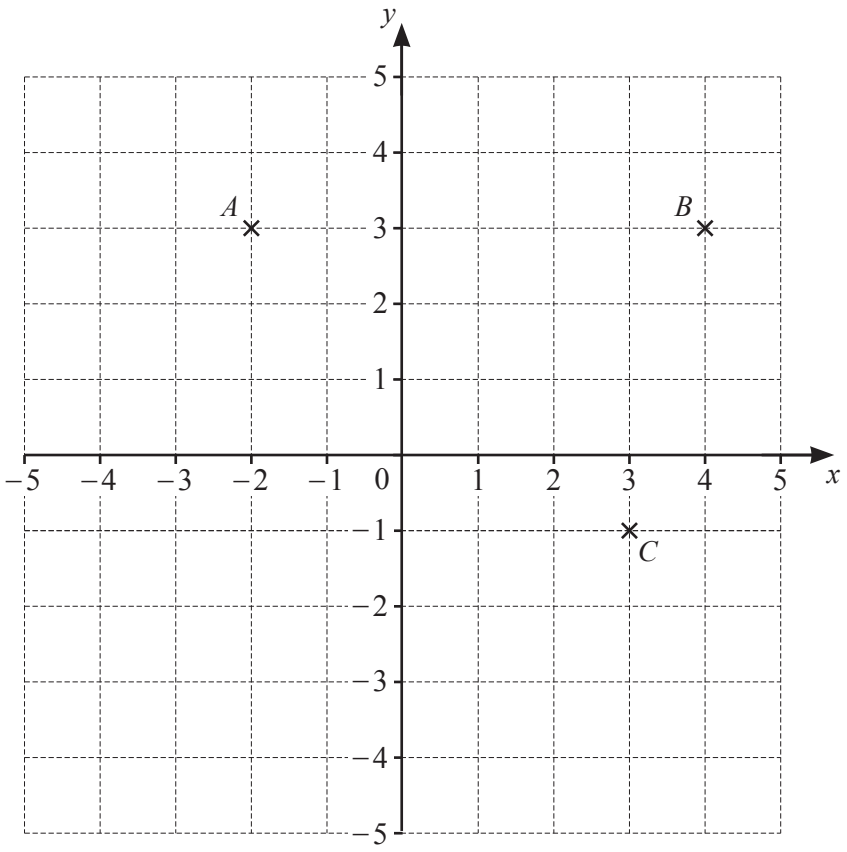
$$(7.3 \times 10^9) \times (1.8 \times 10^{-4})$$

Give your answer in standard form.

..... [2]

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2



Points A, B and C are plotted on a $1\,cm^2$ grid.

(a) Write down the coordinates of

(i) point B,

(..... , ...) [1]

(ii) point A.

(..... , ...) [1]

(b) On the grid, plot the point $(-3, -1)$ and label it D. [1]

(c) Join A, B, C and D to form a quadrilateral.

Write down the mathematical name of quadrilateral $ABCD$.

..... [1]

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(d) Work out the area of quadrilateral *ABCD*.

..... cm^2 [2]

(e) On the grid, draw the reflection of quadrilateral *ABCD* in the *x*-axis. [2]

3 Ralf records the number of people in each car entering the school car park.
The results are shown in the table.

Number of people in the car	Number of cars
1	8
2	13
3	6
4	3
5	2

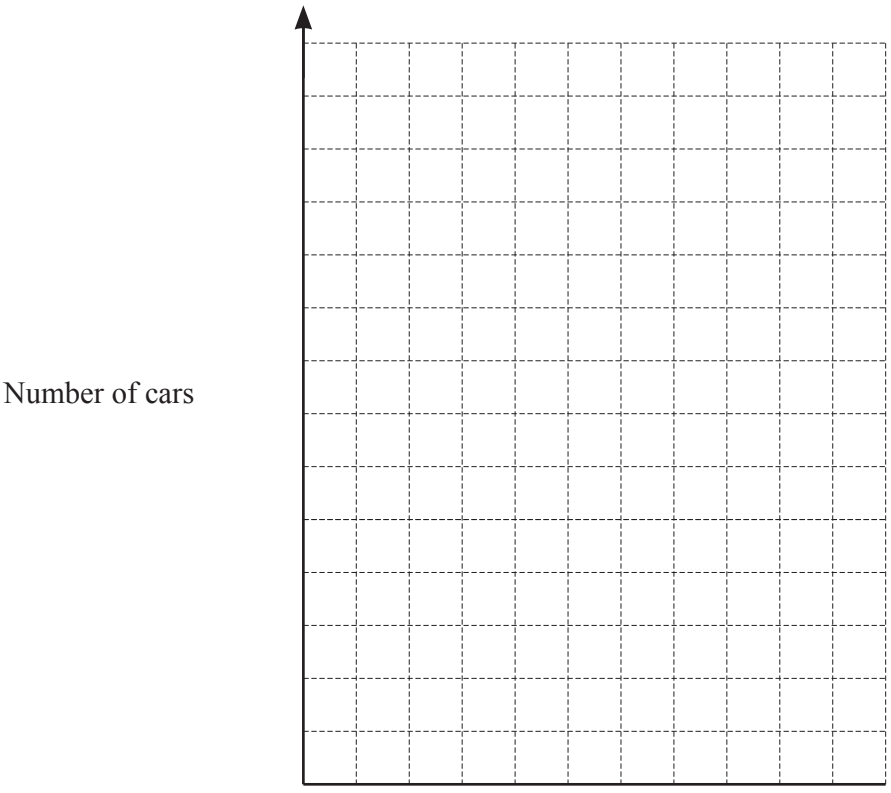
(a) Work out the total number of cars that Ralf records.

..... [1]

(b) Work out the total number of people in these cars.

..... [2]

(c) On the grid, draw and label a bar chart to show the information in the table.



[4]

4 **(a)** Ana is 28 years 3 months old.

Change 28 years 3 months into months.

..... months [2]

(b) Ana has three children.
The ages of the children are

7 years 11 months
5 years 4 months
2 years 6 months.

For these three ages, work out

(i) the range,

..... years ..... months [1]

(ii) the mean.

..... years ..... months [3]

(c) Jon has a watch that records the number of calories he uses when he goes for a walk.
He uses 0.05 calories for each step he takes.
He takes 1250 steps for every kilometre he walks.
One day he uses 300 calories on a walk.

Work out how far he has walked.

..... km [2]

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5 **(a)** Complete this sequence of patterns by drawing Pattern 1 and Pattern 5.

Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5
	x x x x x x x x	x x x x x x	x x x x	

[2]

(b) These are the first four terms of a sequence.

4 7 10 13

For this sequence, write down

(i) the next term,

..... [1]

(ii) the rule for continuing the sequence.

..... [1]

(c) The nth term of another sequence is $3n^2$.

Work out the first two terms of this sequence.

..... and ..... [2]

(d) These are the first five terms of a different sequence.

7 15 23 31 39

Find the nth term of this sequence.

..... [2]

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6 **(a)** Simplify.

$3y + 4y - y$

..... [1]

(b) Solve.

(i) $x + 6 = 20$

$x =$ ..... [1]

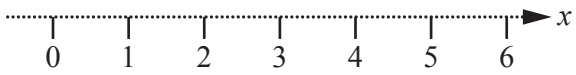
(ii) $\frac{x}{4} = 8$

$x =$ ..... [1]

(iii) $2(x - 3) = 14$

$x =$ ..... [2]

(c) On the number line, show the inequality $x \geqslant 4$.



[1]

(d) Factorise.

$5x + 20$

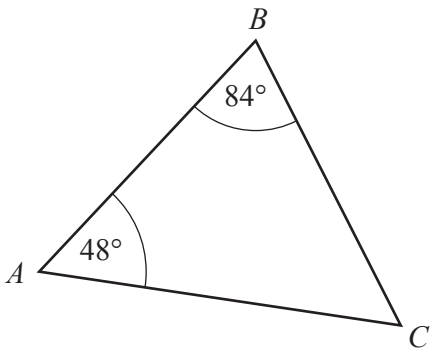
..... [1]

(e) Multiply out the brackets and simplify.

$(6x + 5)(x - 3)$

..... [2]

7 **(a)**



NOT TO SCALE

What type of triangle is ABC?
Show how you decide.

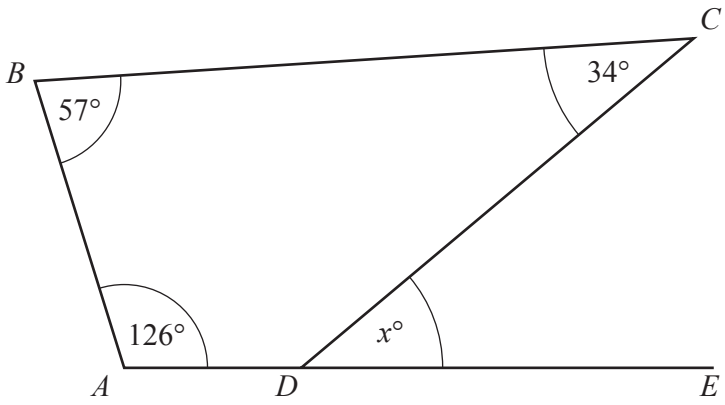
[2]

(b) Work out the size of one exterior angle of a regular pentagon.

..... [2]

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(c)



NOT TO SCALE

In the diagram, *ADE* is a straight line.

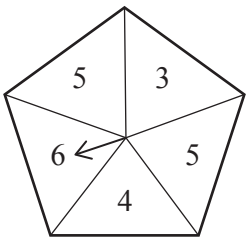
(i) Find the value of x.

$x =$ ..... [2]

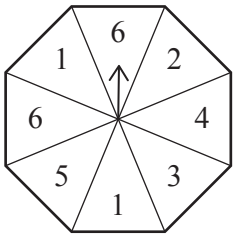
(ii) Show that *ABCD* is **not** a trapezium.

[2]

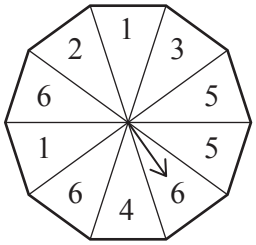
8 Here are three unbiased spinners made from regular polygons.



Spinner A



Spinner B



Spinner C

(a) (i) For **Spinner A** work out the probability of getting 6.

..... [1]

(ii) **Spinner A** is spun twice.
Work out the probability of getting 6 each time.

..... [2]

(b) Show that, of the three spinners, **Spinner C** has the greatest probability of getting 6 on one spin.

[4]

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9 **(a)** Amir has car insurance, home insurance and health insurance.
In one year he spends a total of \$5775 on insurance in the ratio
car : home : health = 2 : 3 : 6.

Work out how much he spends on each type of insurance.

Car \$ .....

Home \$ .....

Health \$ ..... [3]

(b) A company offers Samal health insurance for \$850 when it is **not** bought online.
The company offers a 15% reduction when this insurance is bought online.

Work out how much this insurance will cost Samal if she buys it online.

\$ ..... [2]

(c) Terry's car insurance increases from \$900 to \$1100.

Work out the percentage increase.

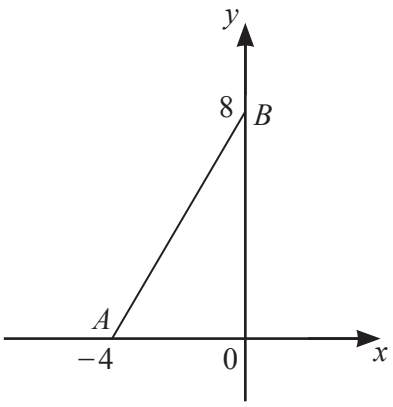
..... % [3]

10 **(a)** The line with equation $y = mx + 1$ passes through the point (3, 19).

Work out the value of m.

$m =$ ..... [3]

(b)



NOT TO SCALE

In the diagram, the line meets the x-axis at A $(-4, 0)$ and the y-axis at B $(0, 8)$.

(i) Find the coordinates of the mid-point of AB.

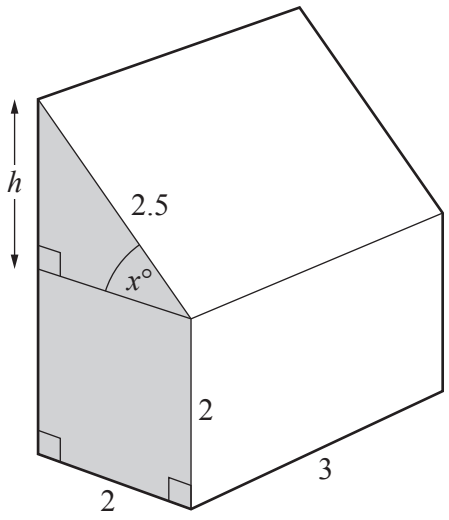
(..... , ...) [2]

(ii) Find the equation of the line AB.

..... [3]

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11 In this question, all lengths are in metres.



NOT TO SCALE

The diagram shows a shed in the shape of a prism.

(a) Use Pythagoras' Theorem to show that $h = 1.5$.

[2]

(b) Use trigonometry to find the value of x.

$x =$ ..... [2]

(c) **(i)** The end of the shed is shaded.

Calculate this area.

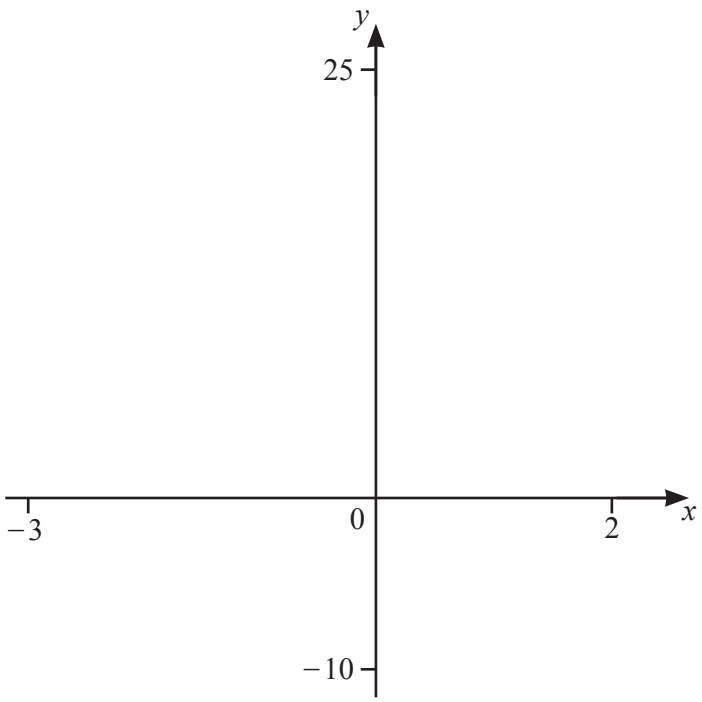
..... m^2 [2]

(ii) Work out the volume of the shed.
Give the units of your answer.

.... [2]

Question 12 is printed on the next page.

12



(a) **(i)** On the diagram, sketch the graph of $y = x^3 + 3x^2$ for $-3 \leqslant x \leqslant 2$. [2]

(ii) Find the coordinates of the local minimum.

(..... , ...) [1]

(iii) Find the coordinates of the local maximum.

(..... , ...) [1]

(b) On the diagram, sketch the graph of $y = 3x^2 - 5$ for $-3 \leqslant x \leqslant 2$. [2]

(c) Find the coordinates of the point of intersection of the graphs of $y = x^3 + 3x^2$ and $y = 3x^2 - 5$.

(..... , ...) [2]

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